NASA SBIR 2007 Phase I Solicitation

S4.06  Advanced Avionics

Lead Center: ARC

This subtopic is seeking proposals to reduce the cost, mass, size, power and complexity of current spacecraft avionics systems, including processors, switch boxes, payload control units, mass storage devices, star trackers, IMUs, and power converters to support smaller (micro and nano) class space vehicles.

NASA has been studying methods to assemble space missions quicker and in a more straightforward manner using “plug and play” (PnP) approaches. Modern plug-and-play includes both the traditional boot-time assignment of I/O addresses and interrupts to prevent conflicts and identify drivers, as well as hot plug systems such as USB and Firewire. This SBIR will explore the hallmarks of next-generation avionics. A major challenge to achieving a usable and useful low cost small mission is the ability to rapidly compose the system to perform both the needed mission functionality using the available spacecraft components. Physical assembly of the PnP spacecraft components is a necessary, but insufficient condition for achieving a system. The assembled system needs to provide the functional capabilities to support the intended mission and also needs to provide the functional capabilities to ensure the operational health and safety of the resulting space mission. A preliminary architectural model to provide a reusable infrastructure is requested as part of effort this supports hard real time, soft real time and non-real time processes.

The objective of this SBIR effort is to prove the viability of modular, plug and play (PnP) spacecraft avionics architecture. This revolutionary architecture provides a near-term solution to modular, plug and play avionics while distributing power and data management functions. It enables full PnP modularity reducing spacecraft integration and test to a few days.

Areas of interest include:
- Low cost open architecture avionics systems;
- Plug and Play adapters that facilitate transition from traditional point to point proprietary control to an open architecture industry standard interface both hardware and software;
- Validate components by producing low cost standard plug and play components including processors, switch boxes, payload control units, mass storage devices, star trackers, IMUs, and power converters.

Phase 1 - Research should identifying and evaluating candidate telecommunications technology applications to demonstrate the technical feasibility and show a path towards a hardware/software demonstration. Plan a demonstration to validate the technologies/tools/processes. Bench or lab-level demonstrations showing concept viability is encouraged. Commercial applicability should be addressed.

Phase 2 - Emphasis should be placed on developing and demonstrating the technology under simulated flight conditions. Additionally, a path should be outlined that shows how the technology could be commercialized or further developed into space-worthy systems defining interfaces (both on the spacecraft and to candidate ground segments). When applicable, researchers should deliver a demonstration unit for functional and environmental testing at the completion of the Phase 2 contract.